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Original article

Clinical outcomes of proximal row carpectomy by preoperative midcarpal joint morphological classification: Viegas type I versus type II

Résultats cliniques des résections de la rangée proximale du carpe en fonction de la classification morphologique préopératoire du médiocarpe : type I versus type II de Viegas

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ABSTRACT

The midcarpal joint can be classified into two anatomical types – Viegas type I and Viegas type II – based on the absence or presence of a medial facet for the hamate on the lunate (lunohamate facet). Type I is associated with a round capitate shape, which theoretically allows better congruence with the lunate fossa of the distal radius following proximal row carpectomy (PRC). This morphological feature has never been considered as a predictive factor of clinical outcome for this surgical procedure. This study aimed to compare the clinical and radiological outcomes of the two Viegas types following PRC. A retrospective single-center study was carried out on patients who underwent PRC for wrist osteoarthritis. Minimum follow-up was 2 years. Lunate type was determined based on preoperative CT arthrography. The clinical evaluation included range of motion (ROM) and strength as well as the functional DASH, Mayo Wrist scores and a VAS for pain. The outcome of radiocapitate osteoarthritis was assessed on plain radiographs. Forty patients were reviewed with a mean follow-up of 57 months. Twenty-one Viegas type I and 19 Viegas type II were identified on preoperative CT arthrography. The etiologies included 23 SLAC wrists (12 Viegas type I, 11 type II), 8 SNAC wrists (4 Viegas type I, 4 type II), 6 cases of Kienböck's disease (3 type IIIa, 3 type IIIb with 3 Viegas type I and 3 type II), 1 Preiser's disease and 2 cases of transscaphoid perilunate dislocation of the carpus. Patients with a Viegas type I lunate had significantly greater flexion-extension ROM: 83.5° vs. 71° ($P = 0.04$) and radial deviation: 12° vs. 7° ($P = 0.013$) than those with Viegas type II. However, three cases of complex regional pain syndrome (CRPS) were reported in the Viegas type II group vs. zero in the Viegas type I group. There were no differences between the two groups in terms of strength, functional scores or VAS pain. The outcome of radiocapitate osteoarthritis was similar in both groups. Considering the number of CRPS cases in the Viegas type II group and similar functional results in both groups, the worse outcomes of the Viegas type II patients in terms of ROM cannot be considered as clinically relevant. This comparative study does not provide a reasonable basis for concluding that Viegas type I patients are better candidates for PRC than Viegas type II patients.

RÉSUMÉ

L'articulation médiocarpienne peut être caractérisée selon deux types anatomiques : les types I de Viegas sans facette articulaire du lunatum pour l'hamatum (facette luno-hamatale) et les types II avec lunatum présentant une facette luno-hamatale. Les types I sont associés à une tête de capitatum anatomiquement plus arrondie permettant théoriquement une meilleure congruence avec la fossette lunarienne du radius

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après résection de la rangée proximale du carpe (RRPC). Cette particularité morphologique n'est à ce jour pas prise en considération comme facteur prédictif du résultat clinique de cette intervention. L'objectif de cette étude était de comparer les résultats cliniques des deux types de Viegas après RRPC. Une étude rétrospective monocentrique a été réalisée sur des patients opérés d'une RRPC pour une arthrose radio-carpienne. Le recul minimum était de 2 ans. Les types de Viegas ont été déterminés sur l'arthroscanner préopératoire. L'évaluation clinique incluait la mobilité, la force ainsi que les scores fonctionnels DASH, Mayo Wrist score et une échelle de douleur EVA. L'arthrose radio-capitale était évaluée sur clichés radiographiques postopératoires. Quarante patients ont été revus avec un recul moyen de 57 mois. Les arthroscanners préopératoires ont permis de distinguer 21 types I et 19 types II de Viegas. Les étiologies regroupaient 23 SLAC (12 Viegas type I, 11 type II), 8 SNAC (4 Viegas type I, 4 type II), 6 maladies de Kienböck (3 type IIIa, 3 type IIIb avec 3 Viegas type I et 3 type II), 1 maladie de Preiser et 2 luxations-fractures trans-scapho rétrolunaires du carpe. Les patients avec lunatum de type I de Viegas présentaient des mobilités significativement supérieures pour les volants de flexion-extension : 83,5° vs 71° ($p = 0,04$) et pour l'inclinaison radiale : 12° vs 7° ($p = 0,013$). Trois cas d'algodystrophies ont été rapportés dans le groupe Viegas type II et aucun dans le groupe Viegas type I. Il n'y avait pas de différence entre les groupes concernant les scores fonctionnels, l'EVA et la force. L'arthrose radio-capitale était comparable dans les deux groupes. Au regard du nombre de cas d'algodystrophie dans le groupe Viegas II et des résultats fonctionnels comparables, les résultats inférieurs des types II sur la mobilité ne peuvent être considérés comme cliniquement pertinents. Cette étude comparative ne permet pas de conclure que les patients Viegas type I soient de meilleurs candidats à la RRPC par rapport aux patients Viegas de type II.

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1. Introduction

The choice of surgical procedures for radiocarpal osteoarthritis is still matter of debate [1]. Total wrist denervation provides pain relief yet maintains wrist motion, partial wrist arthroplasty is still being assessed and pancarpal arthrodesis has to be a last resort.

Provided the midcarpal joint is well preserved, proximal row carpectomy (PRC) and partial carpal arthrodesis (PCA) are the most common surgical procedures [2] in this indication providing pain relief in a functional range of motion. The choice between these two methods is guided by the condition of the midcarpal joint, which contraindicates PRC [3] in cases of degenerative damage.

In all cases of radioscaphoid arthritis with an intact midcarpal joint, the choice is often guided by age, functional demands and wrist mobility without taking into account the morphological characteristics of the midcarpal joint [1,4]. Lunates with no lunohamate facet are defined as Viegas type I, whereas lunates with a lunohamate facet are defined as Viegas type II [5]. The usual prevalence of type II lunate varies from 44% [4] to 73% [6]. Some cadaver studies have shown a clear association of these type II lunates with one particular capitate shape. Yazaki et al. [7] classified the proximal capitate into three types: flat (65%), spherical (22%), and "V-shaped" (14%) with a sagittal crest supposedly less congruent with the lunate fossa of the distal radius following PRC. All the "V-shaped" capitates are associated with Viegas type II lunates. On the other hand, Viegas type I lunates are exclusively associated with flat or spherical-type capitates [7]. Several studies have hypothesized that Viegas type I lunates are associated with better clinical outcomes following PRC due to better radiocapitate congruence [7,8].

The aim of this study was to compare the clinical outcomes and the onset of radiocapitate arthritis following PRC based on the Viegas type.

2. Materials and methods

A single-center retrospective study with a minimum follow-up of 2 years was carried out. We included all patients operated from March 1996 to May 2010 for PRC for wrist osteoarthritis with a preoperative CT arthrography. We excluded patients who had undergone PRC for other reasons.

2.1. Morphometric evaluation on preoperative CT arthrography scans

The two groups were defined according to the lunate classification of Viegas et al. [4,5] determined on the preoperative CT arthrography scans (Figs. 1 and 2). The criterion defining the presence of a lunohamate joint was the existence of a concave or straight lunohamate facet, which could be differentiated from the lunocapitate joint surface. A convex surface was considered as a negative criterion [9].

2.2. Surgical technique

The procedure was carried out under regional anesthesia, with a tourniquet at the base of the limb. The wrist was approached with a dorsal longitudinal incision centered on Lister's tubercle. Partial wrist denervation by posterior interosseous nerve neurectomy was performed systematically. We checked for the absence of degenerative lesions of the head of the capitate and the lunate fossa of the distal radius. The proximal row was resected while being careful to preserve the volar capsule. Postoperatively, the patients were immobilized with a short arm cast for 3 weeks, then the rehabilitation was initiated to recover wrist range of motion (ROM).

2.3. Clinical and radiographic evaluation

Demographic data (age at surgery, gender, follow-up duration, dominant operated hand, type of work, work-related accident, previous surgery, etiology) were collected. Patients were asked to complete two functional evaluation questionnaires: a Disability of Arm and Shoulder (DASH) and a Mayo Wrist Score. Pain assessed through a visual analog scale (VAS) at rest and during normal activity, and satisfaction were additional criteria for the functional evaluation. Objective assessments included ROM and strength. Grip and pinch strength was measured with a Jamar dynamometer (Asimov Engineering, Los Angeles, CA) and Preston pinch meter (Preston, Clifton, NJ).

A detailed X-ray analysis assessed the patterns of degenerative osteoarthritis of the radiocapitate joint. Degenerative joint disease was rated according to the Culp et al. classification in four stages [3]: stage 1: no degenerative joint disease; stage 2: decreased joint space alone; stage 3: decreased joint space with adjacent